

REMARKS

Claims 1 through 16 and 18 through 25 are pending in the present application. By this Amendment, Applicants have withdrawn from consideration claims 20, and 23 through 25, and have amended Claims 1, 12, 13, 21 and 22. The Applicant has also submitted two additional claims, Claims 26 and 27, for the Examiner's consideration.

The Examiner previously restricted the invention to the apparatus claims or the method claims. The Examiner has constructively elected the apparatus. Applicants hereby affirm that election, subject to its position that the device and system claims of 21 and 22, respectively, should be part of the elected group rather than claim 20. Accordingly, Claims 1 through 6, 12 through 16, 18 & 19, 21 & 22, 26 & 27 are at issue.

THE REJECTION OF CLAIMS UNDER 35 U.S.C. §112.

The Examiner has properly rejected claims 12 through 16, 18 and 19 and 22 as being indefinite due to claims 12 and 22 being unclear whether electrical connection of the non-ferrous heating element to the power supply is required. The Applicant has amended claims 12 and 22 to remove this basis for rejection.

THE REJECTION OF CLAIMS UNDER 35 U.S.C. §103

The Examiner has rejected claims 1, 3 through 6, and 21 as being unpatentable over *Davis*. U.S. Patent No. 5,259,901 (hereinafter "*Davis*") in view of *Hollingsworth*, U.S. Patent No. 5,266,137 (hereinafter "*Hollingsworth*").

Section 2141 of the MPEP states that "Patent examiners carry the responsibility of making sure that the standard of patentability enunciated by Supreme Court and by the Congress is applied in each and every case." (Emphasis original.) "Office Policy is to follow *Graham v. John Deere Co.* in the consideration and determination of obviousness under 35 U.S.C. 103. ...(T)he four factual inquiries enunciated there as a background for determining obviousness are as follows:

Determining the scope and contents of the prior art;

Ascertaining the differences between the prior art and the claims at issue;
Resolving the level of ordinary skill in the pertinent art; and
Evaluating evidence of secondary considerations.”

“Accordingly, examiners should apply the test for patentability under 35 U.S.C. 103 set forth in *Graham*. When applying 35 U.S.C. 103, the following tenants of patent law must be adhered to:

The claimed invention must be considered as a whole;

The references must be considered as a whole and suggest the
desirability and thus the obviousness of making the combination; and

Reasonable expectations of success is the standard with which
obviousness is determined.

Hodash v. Block Drug Co. Inc., 786 F.2d 1136, 1143 n.5, 229 USPQ 182,
187 n.5 (Fed. Cir. 1986).”

Section 2143.01 of the MPEP recognizes that a combination of references teaching every element of the claimed invention is insufficient to for a rejection based on a prima facie case of obviousness without the references creating a motivation to combine, citing *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). Further, “(t)he level of skill in the art cannot be relied upon to provide the suggestion to combine references”, citing *Al-Site Corp. v. VSI Int’l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

Section 2143 of the MPEP further states that “if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” *In re Gordon* 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)

This limitation upon proper use of an obviousness rejection is repeated in Section 2145(X)(C) of the MPEP, stating “As discussed in MPEP §2143.01, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine reference teachings. The Federal Circuit has produce a number of decisions overturning obviousness rejections due to a lack of

suggestion in the prior art of the desirability of combining references, as discussed in the aforementioned section.” (Emphasis supplied.)

The Examiner states

“*Davis et al* discloses an inflatable mandrel (inflatable bladder) comprising a cured matrix material such as silicone elastomer and reinforcement fiber wherein the fiber is incorporated in the elastomer using hoop winding, helical winding and/or polar winding. The reinforcing fiber may be a graphite fiber. See col. 7 lines 47-50. In claims 1 and 21, the “nonmetallic, electrically conductive fibers reads on the graphite fibers of *Davis et al*. Claims 1 and 21 contain a product by process limitation. In claim 1, for example, the product by process limitation is “said flexible matrix being cured to a stable elastomeric state by electric resistive heating of said fibers”. This product by process language fails to require structure not shown by *Davis et al*. See MPEP 2113. In any event: It would have been obvious to provide the inflatable mandrel of *Davis et al* so as to satisfy “said flexible matrix being cured to a stable elastomeric state by electric resistive heating of said fibers” (emphasis by Examiner) since *Davis et al* teaches curing the matrix material (e.g. the silicone elastomer) using an autoclave and using fibers such as graphite fibers.”

“As to claims 1, 3 and 21, it would have been obvious to one of ordinary skill in the art to use cable lines to connect the fibers (carbon fibers) of the inflatable mandrel of *Davis et al* to an electrical energy source so that the inflatable bladder can be heated by resistive heating and thereby cure the composite material during the use of the inflatable bladder in composite manufacture since (a) *Davis et al* teaches using the inflatable

mandrel including wound fibers in composite manufacture wherein the composite is cured and (b) *Hollingsworth*, als directed to using a mandrel in composite manufacture, suggests supplying heat for curing composite material on a mandrel using resistive heating wherein carbon fibers molded in elastomer are used as the resistance heating elements (columns 9,10).

It is respectfully submitted that *Davis* does not suggest any using fibers having electrical properties. The Examiner has correctly quoted a portion of text of *Davis* wherein the use of graphite fiber is mentioned. However a more complete review of *Davis* shows that it is directed to fiber properties unrelated to the properties deemed valuable in the present invention. *Davis* makes only passing reference to graphite, stating:

“The type of fiber used may be any number of fibers used to reinforce elastomers such as Kevlar, glass, nylon, dacron, rayon, graphite or boron and the like. ... In an embodiment using silicone, it has been found that winding with a Kevlar fiber is particularly suitable because Kevlar is strong, damage tolerant, and does not stretch as much as most other fibers.”
Col 7, lines 47 – 55. (Emphasis supplied.)

It is readily apparent that *Davis* is interested in fibers having strong mechanical properties without regard to whether the fibers are electrically conductive. Of the fibers listed above, only graphite is electrically conductive. Further, *Davis* teaches Kevlar, a non-conductive material, is preferred with silicone elastomer; silicone being the elastomer taught a component of the present invention. Indeed, most electrically conductive fibers would not have the mechanical properties essential to the *Davis* invention.

Further, *Davis* teaches the manufacture of a bladder by first curing a first layer of elastomer prior to application of fibers, "particularly the elastomer is silicone." (Column 7, lines 25 – 28.) *Davis* states "(t)his first layer of elastomer is then bagged in a conventional manner and autoclave cured." (Column 6, lines 62 – 63.) *Davis* again specifies that "(w)ith multi-layer mandrels having an initially cured base layer of elastomer, once the desired number of layers of elastomer and fiber are applied, the work piece mandrel is again appropriately bagged and autoclave cured as before." (Column 8, lines 57 – 61.)

It is respectfully submitted that *Davis* teaches away from the present invention in multiple ways, including (i) by teaching the use of fibers for mechanical strength in contrast to electrical conductivity, (ii) by teaching the use of Kevlar fibers for use with silicone elastomers, and (iii) teaching use of bagging and autoclave technology as the method of curing the elastomer.

As the Examiner appreciates, the present invention teaches the use of electrically conductive fibers within the multi-layers of elastomers for a heat source for curing the elastomer (and for subsequent heating of other objects within which the inflatable elastomer is placed) and the advantages of using graphite fibers over other electrically conductive fibers, e.g., copper, in conjunction with silicone elastomers. There is no suggestion within *Davis* as to the desirability of these materials or methods. It is respectfully submitted that there is no suggestion that the fibers within the elastomer be connected to electrical energy so that the inflatable bladder could be heated by resistive heating and thereby cure the composite material. Of the five types of fibers specified by *Davis*, only one is electrically conductive.

The Examiner has cited the teaching of *Hollingsworth* pertaining to the use of carbon fibers for resistive heating within a mandrel used to create large composite structures. Components of the mandrel also can be manufactured of a composite material. However, the mandrel taught by *Hollingsworth* used in used in a dramatically different application and, more significantly, is a mandrel of a completely different structure.

Hollingsworth expressly states:

“The present invention overcomes the foregoing deficiencies of the prior art by providing an improved mandrel for use in fabricating fibrous composite shells, such as pressure vessels, rocket motor cases, aircraft fuselages, and other hollow structures, via filament winding, braiding, hand lay-up or other fabrication methods for forming such structures. When assembled, the segmented mandrel and inflatable support of the present invention is lightweight, rigid, dimensionally stable and uses not internal mechanical supports or fasteners.”
(Column 5, lines 30 – 39.) (Emphasis supplied.)

The mandrel taught by *Hollingsworth* comprises a plurality of rigid interlocking segments. The segments may be constructed of composite materials such as carbon/epoxy composite materials. The segments may also be made, in whole or in part, of metal such as aluminum. (Column 6, line 56 through 64.)

Significantly, *Hollingsworth* teaches that “due to the unique design of this invention, some uncommon methods may be used to provide heat for curing the part.” (Column 9, lines 62 – 64.) The Applicant respectfully suggests that this cited text directs the reader away from using the heating techniques for other applications.

Further, *Hollingsworth* teaches use of one or more reusable bladders of a silicone elastomer. (Column 8, line 67 to Column 9, line 13.) The bladders may contain silicone rubber flexible heaters. *Hollingsworth* specifies the heaters as “(s)ilicone rubber heaters are silicone rubber sheets which have resistance elements molded therein. These heaters may be used as outside surface elements of the bladder(s), which make intimate contact with the inside surface of the mandrel segments.” (Column 10, lines 5 – 9.)

Significantly, *Hollingsworth* teaches this heating method as part of an inner bladder pressed against a rigid multi-segmented mandrel component, or as part of the rigid mandrel component separate from the inflatable bladder. (Figures 4 and 16 and Column 18, line 55 to Column 19, line 2.) The device subject of *Hollingsworth* is a rigid mandrel with an inflatable support.

It is the Applicant's position that the teachings of *Davis*, combined with the reference to *Hollingsworth*, fails to teach or suggest all of the claim limitations set forth in Applicant's new claim 11. It is the position of the Applicant that the *Davis* patent does not disclose the elements of the Applicant's invention listed above and, indeed, teaches away from the Applicant's invention. Further, the *Hollingsworth* patent does not suggest use of an inflatable bladder separate from a rigid mandrel component, but rather emphasizes the need for a rigid structure capable of withstanding outer pressures. *Hollingsworth* requires the strong, rigid and interlocking segments for the mandrel. An inflatable bladder alone would not work in the applications subject of the *Hollingsworth* invention. In accordance with MPEP §2143.01, the teachings of *Hollingsworth* can not be properly be cited as a reference in an obviousness rejection.

Further, the "silicone rubber flexible heaters" described in *Hollingsworth* are components for which the Applicant's invention improves. More important, *Hollingsworth* discloses that such heaters "may be used as outside surface elements of the bladder(s)." That is, the heaters are not structurally part of the mandrel, and the heating elements of the heaters are not embedded in the assumedly cylindrical body of the bladder(s). Instead, the silicon rubber heaters are separate from the bladders in this regard. According the combination of the devices discussed in *Hollingsworth* with the mandrel of *Davis* would not provide the devices of Claims 1 or 21.

Further, it is the Applicant's position that the Examiner has not met his burden on factually support any prima facie conclusion of obviousness. The teaching or suggestion to make the claimed combinations and the reasonable expectation of success must both be found in the prior art, not in the Applicants' disclosure. *In re Vueck*, 947 F. 2d 488, 20 USPQ 2d 1438 (Fed. Cir. 1991)

The Examiner has also rejected Claim 2 under 35 U.S.C. 103(a) as being unpatentable over *Davis et al* in view of *Hollingsworth* and Europe '761 (EP 432761), *Guenther et al* (U.S. Patent No. 5216085) or *Rianda* (U.S. Patent No. 4792374) for the stated reason that:

“As to Claim 2, it would have been obvious to use fluorosilicone or fluorocarbon for the matrix of the bladder of *Davis et al* in view of Europe'761, *Guenthner et al* or *Rianda* – Europe '761 suggesting use of fluorosilicone for a bladder, *Guenthner et al* suggesting the use of fluorocarbon for a bladder and *Rianda* suggesting the use of fluorosilicone for a bladder.”

The Applicant respectfully states that its original application acknowledged the use of these materials for the device. The Applicant's application points out the incompatibility of using ferrous or metallic conductive materials with a flexible bladder materials containing silicone. The Applicant's application also points out use of silicone material used inflatable bladders in conjunction with polyester or epoxy based resins. It is the Applicant's position that the Examiner's citation to *Davis et al* in view of *Hollingsworth* in further view of *Europe'761*, *Guenthner et al* or *Rianda* does nothing to cure the deficiency of the obviousness rejection based on *Davis et al* in view of *Hollingsworth* discussed in the preceding paragraphs.

JAPAN '334

The Examiner has also rejected Claims 1-6, 12-13, 18-19, and 21 under 35 U.S.C. 103(a) as being unpatentable over Japan '334 (JP 2-150334) in view of Japan '161 (JP 6-234161) or Japan '323 (JP 2-138323) and further in view of at least one of *Davis et al* (U.S. Patent No. 5259901), *Wood et al* (U.S. Patent No. 5,706,861), *Hollingsworth* (U.S. Patent No. 5266137), and *Guenthner et al* (U.S. Patent No. 5216085).

The Examiner further states Claims 4-6, 14-16, 18-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japan '334 in view of Japan'161 or Japan 323 and further in view of at least one of *Davis et al*, *Wood et al*, *Hollingsworth* and *Guenthner et al* as applied above and further in view of at least one of *Baker et al* (U.S. 4191383), *Rankin* (U.S. Patent No. 1362351) and *Renaud* (U.S. Patent No. 4861634).

Although a copy of the translated document upon which the Examiner relies has not been provided to the Applicant, it is respectfully suggested that a polyethylene terephthalate thread coated with carbon powder, although presumably electrically conductive, will not possess the mechanical properties of carbon or graphite fibers combined with flexibility and compatibility to silicone elastomers.

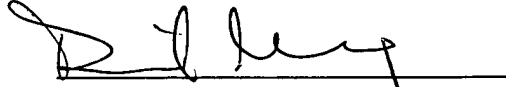
COMMENTS ON REMAINING REFERENCES CITED BY THE EXAMINER

The Applicant has reviewed the additional references made of record and does not believe any one of these references taken alone or in combination would inhibit the patentability of the invention of the present application.

SUMMARY

The Applicant has amended claims 12, 22 rejected by the Examiner which the Applicant believes removes the basis of the Examiner's rejection to claims 12 through 16, 18 and 19 and 22 under 35 U.S.C. §112, second paragraph. The Applicant believes the Examiner's rejection of Claims 1, 2, 3, 6 and 21 under 35 U.S.C. §103(a) to be improper and unfounded for the reasons set forth above. Accordingly, the Applicant respectfully submits that these Claims, and the remaining dependent claims, are allowable. The Applicant has also submitted new claims 24 and 25 that the Applicant believes comply with the comments of the Examiner. Accordingly, the Applicant believes the application, including claims 1 through 6, 12 through 16, 18, 19, 21, 22, 26 and 27, is in order for allowance. Such action is respectfully requested.

Respectfully Submitted,

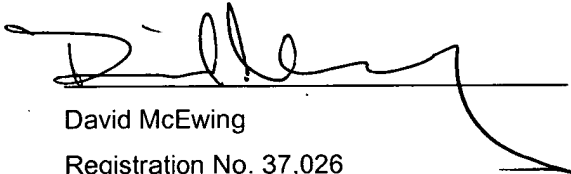


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